

Competitive Intensity and Performance of ICT Firms in Nigeria: The Mediating Effect of Innovation Investment

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ABSTRACT

The peculiar trajectory and performance implications of competition on firms operating in Nigeria's ICT sector motivated this research. The main objective of this study was to determine the mediating effect of innovation investment on the relationship between competitive intensity and performance of ICT firms in Nigeria. The *ex-post facto* research design was adopted in the study. Secondary data were obtained from the annual reports of the 8 listed ICT firms from 2012 to 2023. Data were analyzed using descriptive statistics while the random effect regression result was used to test the hypotheses. The result revealed that there was an insignificant negative relationship between competitive intensity and performance of listed ICT firms in Nigeria ($t_{0.05} = -0.048869$, $p = 0.9612$, $p > 0.05$). The result also showed a significant positive relationship between competitive intensity and innovation investment of the firms ($t_{0.05} = 2.628492$, $p = 0.0103$, $p < 0.05$). However, in contrast with many previous studies, the result showed that innovation investment had a significant positive relationship with the firm performance ($t_{0.05} = 1.613793$, $p = 0.1107$, $p < 0.05$). Following the output of the Sobel test, it was concluded that innovation investment partially mediates the relationship between competitive intensity and performance of ICT firms. It was recommended that, as part of efforts towards mitigating the negative effect of competition, ICT firms in Nigeria should adopt a long-term perspective on innovation investment and also ensure that they complement that with robust implementation strategies that will enhance their performance.

Keywords: Competitive intensity, Performance, Innovation, Innovation Investment, ICT sector, Nigeria

INTRODUCTION

Background to the Study

The information and communication technology (ICT) sector has emerged as a critical driver of innovation and economic growth in many countries. In Nigeria, this sector is characterised by rapid technological advancements, increased mobile and internet penetration, and a vibrant entrepreneurial ecosystem (Elimian, 2023; Price Waterhouse Coopers, 2024). According to the report from the National Bureau of Statistics, the ICT sector accounted for 16.66% of Nigeria's real GDP in the fourth quarter of 2023 (Ibeh, 2024). This data confirms the critical role that this sector currently plays in contributing to the country's economic development and revenue diversification efforts (Dariem, 2020). The potential of this fast-growing sector is immense in areas such as fintech, e-commerce, and digital education which are transforming the socio-economic landscape of Nigeria (Dariem, 2020; Agboola, 2022). International Trade Association (2024) indicated that the growth of the ICT sector is stimulated by increasing demand for digital services, government policies supporting digital transformation, and private sector investment in infrastructure and innovation.

However, as the ICT sector in Nigeria continues to grow in leaps and bounds, the intensity of competition among firms in the sector has also increased (Ogundokun, 2024). Competitive intensity refers to the degree of rivalry among firms within an industry. This rivalry is driven by increased market entry, rapid technological advancements, and evolving consumer preferences (Anning-Dorson, 2016; UKEssays, 2018). According to

Houngbonon and Jeanjean (2017), competitive intensity can act as a double-edged sword. That is, while stimulating firms to innovate it can also exert financial and operational pressures that may hinder firm performance. In the case of ICT firms in Nigeria, the unique market features such as regulatory constraints, limited infrastructure, and high operating costs, all underscore the need for firms to initiate adaptive strategies in order to thrive.

Over the years, innovation investment remains one of the strategic options that firms leverage on, in responding to competitive pressures. Innovation investment entails the allocation of resources toward developing and implementing new technologies, products, or operational processes within a firm (Pisano *et al.*, 2015). It has been noted that the competitive intensity in the ICT sector compels firms operating in the sector to continuously innovate, in order to enhance their operational efficiency, and strategically position themselves in the market (Thakor and Lo, 2022; Oliveira *et al.* 2022).

In Nigeria, ICT sector expenditure on innovation has risen steadily, with firms investing heavily in research and development (R&D), digital infrastructure, and talent acquisition to drive technological advancements (Lesser, 2022; Nigerian Communications Commission (NCC), 2022; International Trade Association, 2024). Mobile telecommunications companies like MTN, Airtel, Globacom and other key players in the ICT sector have significantly expanded mobile network coverage and internet penetration across the country through their fibre optic network expansion projects (Ogbo *et al.*, 2024). They have also pioneered mobile money services, innovative data packages and other novel value-added services, tailored towards significantly altering market trends in the industry and boosting their performance in Nigeria (Dariem, 2020; NCC, 2022).

Performance is a central focus of firm strategy which encompasses multiple dimensions including profitability, market share, and operational efficiency. In the ICT sector, performance metrics have become increasingly dynamic, reflecting shifts in market demands and regulatory policies. In this study, the reported profits of ICT firms is deemed to be a relevant indicator of their performance. Gleanings from previous research suggests that firms with sustained innovation efforts are likely to be better positioned to leverage technological disruptions and maintain a competitive edge (Mabenge *et al.*, 2015; Zaman and Tanewski, 2024). However, as earlier noted, competitive pressures often erode profit margins and disrupt market positions, thereby propelling firms to engage adaptive strategies in a bid to improve or at least sustain their performance (Houngbonon and Jeanjean, 2017; UKEssays, 2018; Ogbo *et al.*, 2024). In view of this, the significance of examining the interrelationship between competitive intensity, innovation investment, and performance of firms in the ICT sector of Nigeria cannot be over-emphasized.

Statement of the Problem

The ICT sector in Nigeria is increasingly characterized by a perceivably stiff and intense competition. This competition is exacerbated by pressures occasioned by regulatory changes, evolving technological disruptions and constantly changing consumer demands. In view of this competitive pressure, firms' operations in the sector seem to have gradually become 'the survival of the fittest'. The relatively younger and smaller firms are in a persistent struggle to 'weather the storm' of the gruesome competition with the 'big giants' in the sector. However, despite the 'heat' of this stiff competition among ICT firms in Nigeria, the empirical relationship between competitive intensity and performance of firms in this sector remains under-researched.

Some of the available research on innovation found that investment in innovation significantly improves firm performance by fostering adaptability and enabling new product/service development (Hou *et al.*, 2019; Hajar *et al.*, 2022). However, the issue about this finding, which motivates this study, is that despite its seeming plausibility, it may not be consistently applicable across all competitive environments. In particular, it is not certain whether the effect of innovation investment on firm performance in Nigeria's ICT sector is similar to what has been observed by researches in other climes or sectors. This doubt is premised on the uniqueness of the competitive and socio-economic landscape of Nigeria and its ICT sector, in comparison with other climes or sectors.

Also, Houngbonon and Jeanjean (2017) asserted that the effect of competitive intensity on firm performance could either be positive or negative. This assertion implies that an increase in the intensity of competition in

any given sector could either stimulate or impede the performance of firms in such sector. This portends two possible directions of effect. This dual implication poses a dilemma for ICT firms in Nigeria, in terms of how to strategically invest in innovation in order to enhance competitiveness without impeding performance. In order to address this problem, it is therefore necessary to empirically confirm which of the directions of effect is applicable in the circumstance of Nigeria's ICT sector.

Moreover, despite the plausible research opinions that competition affects firm performance differently in various industries, the mechanism through which investment in innovation mediates the relationship between competitive intensity and firm performance has not been empirically ascertained within the context of Nigeria's ICT sector. This paucity of such empirical studies in Nigeria's ICT sector results in limited understanding of the mediating effect of innovation investment in this sector. It is pertinent to empirically determine this mediating effect because that will facilitate a clearer perspective on the significance of innovation investment in assisting ICT firms to enhance their performance despite the inescapable phenomenon of the competition that is rife in the sector.

Objectives of the Study

The main objective of the study is to determine the mediating effect of innovation investment on the relationship between competitive intensity and performance of listed ICT firms in Nigeria. The sub-objectives of the study are to:

- i. Ascertain the relationship between competitive intensity and performance of listed ICT firms in Nigeria.
- ii. Determine the relationship between competitive intensity and innovation investment of listed ICT firms in Nigeria.
- iii. Find out the relationship between innovation investment and performance of listed ICT firms in Nigeria.
- iv. Determine the mediating effect of innovation investment on the relationship between competitive intensity and performance of listed ICT firms in Nigeria.

Research Hypotheses

In line with the specific objectives, four tentative propositions guide this study.

H₀₁: There is no significant relationship between competitive intensity and performance of listed ICT firms in Nigeria.

H₀₂: There is no significant relationship between competitive intensity and innovation investment of listed ICT firms in Nigeria.

H₀₃: There is no significant relationship between innovation investment and performance of listed ICT firms in Nigeria.

H₀₄: Innovation investment does not significantly mediate the relationship between competitive intensity and performance of listed ICT firms in Nigeria.

This study is significant because it provides insights on the significance of innovation investment as a mediator of the relationship between competitive intensity and performance for ICT firms in Nigeria, investors, government and ICT policymakers, the general public and future researchers. The study covers a 12-year period, spanning from 2012 to 2023 only. The study is based on quantitative data sourced from the audited reports only. This approach allows for an objective measurement of innovation investment, competitive intensity, and performance indicators within the Nigeria context. However, this approach excludes quantitative insights into innovation strategies. The scope of this study does not cover the details of the specific innovation

strategies adopted by the firms but rather its focus is limited to the cost of initiating, acquiring, developing and implementing such strategies and how such innovation investment affects firm performance. Also, the study which focuses on Nigeria relies more on international literature due to the paucity of Nigeria-based and ICT sector-specific empirical studies on the subject. It is however pertinent to state that these limitations in the study scope and methodology do not undermine the relevance of this study rather it highlights areas where future studies could consider exploring in order to broaden the scope of knowledge on this phenomena.

REVIEW OF RELATED LITERATURE

This section contains a review of the key concepts, relevant theories and empirical literature related to competitive intensity, innovation investment and performance.

Conceptual Review

The concepts of competitive intensity, innovation, innovation investment and performance are reviewed in this section. The review also highlights the conceptual linkages between those concepts as established in literature.

Competitive Intensity

Throughout history, competition has been a defining force in shaping industries, pushing firms to innovate, adapt, and refine their strategies for survival and growth. From the early days of industrial capitalism to the modern digital economy, businesses have continuously traversed shifting competitive landscapes, responding to market forces that dictate their success or decline (Lianos, 2019; Muljani and Ellitan, 2019). The shifting realities have given rise to evolving perspectives and definitions of the concept of competitive intensity by different scholars over time.

Porter (2008) defined competitive intensity as the rivalry among existing firms in an industry that is driven by factors such as cost considerations, number of competitors, rate of industry growth, and the degree of product differentiation. This structural perspective of competition focuses on how the number of competitors and degree of rivalry shape the level of dynamism in the industry (Porter, 2008; Hana, 2013; Dess *et al.*, 2014). In industries with numerous players, firms face pressure to adopt aggressive pricing strategies, enhance product features, and improve customer experience (Bouncken *et al.*, 2013; Nwachukwu and Vu, 2022). This suggests that the structural intensity of competition is essential for developing sustainable strategies, as high rivalry might erode firm profitability if not managed effectively.

Competitive intensity is also defined as the extent to which firms actively compete for resources, customers, and market share (Kraus *et al.*, 2012). This view portrays competition as an active struggle among firms, where resources are contested and market dominance is sought. Highly competitive intensity fosters innovation as firms strive to outperform rivals, but it also creates significant pressure to optimize costs and improve efficiency (Huang, 2023). Kraus *et al.*, (2012) opined that firms that fail to adapt or invest sufficiently in continuous R&D investment and product differentiation may lose their market position. This perspective of competitive intensity tends to emphasize the criticality of strategic resource allocation in highly competitive environments.

Soto-Acosta *et al.* (2016) viewed competitive intensity as the pressure exerted by competitors' actions, such as pricing strategies, product innovations, and marketing campaigns. This view underscores the reactive dimension of competitive intensity, where firms must respond to rivals' strategic actions. High levels of such pressure demand agility, quick decision-making, and an ability to predict competitive moves. This reactive dimension is what motivates firms to cultivate organizational agility and invest in tools that enhance responsiveness to competitive threats and opportunities (Thakor and Lo, 2022; Oliveira *et al.*, 2022).

Bamfo *et al.*, (2019) opined that competitive intensity reflects the degree of market saturation, where firms compete for a limited customer base. It is believed that market saturation exacerbates competition as firms seek to retain or expand their share of the limited customer base. In such environments, differentiation and customer loyalty become crucial (Bamfo *et al.*, 2019; Nwachukwu and Vu, 2022). These views suggest that firms might

need to innovate continuously and engage deeply with customers to achieve a sustainable competitive advantage in saturated markets. Chuen and Teo (2015) indicate that competitive intensity also encompasses the interplay of external factors such as technological advancements, regulatory changes, and economic conditions that influence competition. This definition situates competitive intensity within a dynamic and evolving context where external factors, such as technological innovation or regulatory shifts, can redefine competitive boundaries and introduce new rivals. In view of this, firms strive to remain proactive and flexible, employing scenario planning and innovation to adapt to the changing external factors.

It is evident, from the foregoing review, that there are different definitions of competitive intensity. Each of the different definitions underscores a distinct dimension of competitive intensity. However, put together, all the different perspectives of definitions provide a multi-dimensional understanding of the concept of competitive intensity. In other words, the various definitional perspectives portray competitive intensity as a multifaceted and critical business construct that could potentially influence innovation, investment decisions, and overall firm performance.

Also, just like the definitions of competitive intensity are varied, different measures of the concept have been highlighted in literature. These measures range from question-based surveys to quantitative indices (Kwienecinski, 2017). The percentage of firm revenue to total sector revenue is a measure of competitive intensity which supposes that the higher the percentage of the firms revenue relative to the revenue of the sector, the more competitive such a firm would be deemed to be, and vice versa. From the standpoint of revenue, this measure indicates the share of a sector market that a firm in that sector has been able to claim during the period (Corporate Finance Institute, 2024). An extension of this measure is the Herfindahl-Hirschman Index (HHI) which was developed by Herfindahl and Hirschman in 1945. This index is used to assess the level of competition within an industry by measuring the degree of market concentration. The HHI is calculated by squaring the market share of each firm within the sector and then summing these squared values. A higher HHI implies more concentration and lesser competition, and vice versa (Zaman and Tanewski, 2024).

In this study, the competition intensity is measured using a more recent model deduced from the Lerner index of market power. This model was specified and used by Hounghonon and Jeanjean (2017). The model is mathematically represented as:

$$\theta_{it} = 1 - (\text{EBITDA}_{it} \div \text{Revenue}_{it})$$

Where θ_{it} denotes competitive intensity of firm i in year t . EBITDA_{it} is earnings before interest, taxes, depreciation and amortization of firm i in year t . Revenue_{it} is the total revenue generated by firm i in year t .

Meaning of Innovation

The Oxford Learner Dictionary defined innovation as the introduction of new or unique ideas, methods, or products, emphasizing its distinctiveness and novelty. Kotler and Keller (2016) defined innovation as any good, service, or idea perceived as new. This implies that the concept of innovation is subjective. In other words, what is innovative to one may not be perceived as innovative by another. Lesser (2022) added that innovation is not merely about creativity or novelty but also its successful implementation. This is because it is the successful implementation of the novel idea, method, product or service that situates its potentials for enhancing the firm's success. In simple terms therefore, Lesser (2022) posited that an idea or creation is only innovative if it is implemented effectively.

Pachouri and Sharma (2016) viewed innovation as the realization of new ideas that enhance organizational performance across products, services, and processes. Their perspective connects innovation directly to measurable improvements, emphasizing its role in achieving strategic objectives. Ndesaulwa and Kikula (2016) linked innovation to the application of scientific and technological knowledge, focusing on the creation of improved solutions. This perspective reflects a more technical dimension of innovation which is driven by advancements in science and technology. This perspective described innovation as the introduction of

improved processes, products, or services grounded in organizational expertise and knowledge, thereby reinforcing the importance of organizational capacity in fostering innovation.

Zaman and Tanewski (2024) added breadth by including significantly improved goods or services, operational processes, managerial practices, or marketing methods as forms of innovation. This view highlights the diverse domains where innovation manifests, from product development to strategic management. Mabenge *et al.* (2020) emphasized the implementation of ideas that enhance performance across multiple business functions. These diverse views offer a comprehensive view of the scope of innovation.

Innovation Investment

Scholars have defined innovation investment from distinct but interrelated perspectives. Innovation investment entails the allocation of resources toward developing new technologies, products, or operational processes within a firm (Pisano *et al.*, 2015). Alighanbari *et al.* (2022) described innovation investment as the strategic allocation of capital into companies or projects that create new markets, expand existing ones, or disrupt traditional industries. They argued that innovation investments often focus more on structural and transformative trends rather than transient shifts. Similarly, the Organisation for Economic Co-operation and Development (OECD) (2018) defined innovation-related expenditures as investments in research and development (R&D), technology acquisition, and human capital development. According to OECD (2018), these activities are pivotal in enhancing productivity and fostering a firm's capacity for continuous improvement.

Mezzanotti and Simcoe (2023) viewed innovation investment as investment in R&D. This view appears rather too over-simplistic, as the review of the concept of innovation in this study had shown that innovation goes beyond just R&D. Literature indicates that R&D is a special type of investment which often poses information asymmetry problem as the firm may be reluctant to disclose detailed information on new endeavors due to strategic consideration (Khan *et al.*, 2019). At the firm level, innovation investment encompasses a range of activities. Beyond funding for R&D, it also entails upgrading technological infrastructure, and fostering a culture of creativity and experimentation (Weiyu *et al.*, 2022). Mabenge *et al.* (2020) posited that such investments in innovation has the potential of enabling firms to enhance their operational efficiency and market responsiveness, which in turn could ultimately contribute to the improvement of their performance.

Hsu *et al.* (2014) indicated that due to the exploratory nature of innovation, it necessitates considerable investment in intangible assets. This stems from the fact that intangibles include assets such as intellectual property, brand reputation and goodwill that represent a firm's innovations (Potepa and Welch, 2017; Price WaterHouse Coopers, 2024). Beyond intangibles, scholars have also advocated for the consideration of investment in equipment. Hitt *et al.*, (2015) and, Porter and Heppelmann (2015) asserted that every piece of equipment acquired by a firm inherently contributes, either directly or indirectly, to its capacity for innovation by enhancing operational efficiency, technological capability, or strategic adaptability.

It has also been noted in ICT and other similar sectors, some of the firms' innovation expenditures are devoted to the acquisition and internal development of software as well as the acquisition of technologies embodied in new equipment (Cainelli *et al.* 2004). Caviggioli *et al.*, (2017) pointed out that investment in some equipment has a close relationship with the way in which certain processes are carried out in some sectors. However, Osorio (2023) noted with concern, the fact that in assessing innovation, investment in equipment which impacts innovation capacity, had in many cases, been underestimated.

The sum of the views of Cainelli *et al.* (2004), Potepa and Welch (2017), Caviggioli *et al.* (2017) and Osorio (2023) inform the choice of the proxy for innovation investment in this study. In this study, innovation investment is measured as the aggregate cash outflows from investment in intangibles and, Property, Plant & Equipment (PPE).

Performance

Generally, in business, performance is a firm's ability to achieve its goals and make profit using its resources (Okafor, 2023). The concept of performance within the context of ICT firms can be viewed from two standpoints. Firstly, is the standpoint of customers and other external stakeholders and secondly, the standpoint of the management and the shareholders of the firm.

From the perspective of customers and other external stakeholders, performance is linked to the ability of ICT firms to provide innovative, reliable, and customer-centric solutions while addressing broader societal needs. Competitive intensity often compels firms to prioritize innovation to meet rising consumer expectations and foster loyalty. In this context, performance is evaluated not just in terms of product or service quality but also through the firm's social responsibility and contributions to digital inclusion. ICT firms that channel innovation investments toward addressing societal challenges, such as improving access to digital tools and ensuring data security, tend to enhance their reputation and stakeholder trust. Freeman *et al.* (2020) observed that such firms that have strong stakeholder relationships are better positioned to achieve sustainable performance.

For management and owners, performance reflects the firm's ability to leverage innovation investment as a strategic response to competitive intensity. This involves achieving financial outcomes such as profitability, market share, and return on investment as well as enhancing adaptability and resilience (Hameed *et al.*, 2021). In a highly competitive industry, where expectations and technological standards are continuously rising, maintaining high performance is crucial for long-term survival (Barney, 1991; Bamfo *et al.*, 2019). The strategic alignment of competitive intensity and innovation investment is believed to be critical in driving long-term value creation and shareholder satisfaction (Havir, 2019).

In this study the performance of ICT firms in Nigeria is viewed from the standpoint of management and the shareholders. In view of this, performance, in this study, is measured as firms' reported profit for the year.

Competitive Intensity and Performance

There have been mixed views on the relationship between competitive intensity and performance. This suggests that in literature, the relationship between these concepts is dual in nature. Some scholars opine that heightened competition drives firms to innovate and improve (Thakor and Lo, 2022; Oliveira *et al.* 2022). This viewpoint believes that competitive pressure incentivizes companies to develop novel products, improve processes, and adopt advanced technologies to maintain or improve their market position. The expected outcome of this effort is improved efficiency which should stimulate increased patronage and revenue, and ultimately lead to greater profitability and better performance.

On the other hand, other scholars caution that excessive rivalry can erode profitability and deter long-term investments (Houngbonon and Jeanjean, 2017). In a bid to outperform each other, firms incur increased operational costs which deplete their profit margins. This financial strain can make it challenging for such firms to allocate resources toward long-term investments, such as R&D or infrastructure improvement, which are essential for innovation and sustained growth (Huang, 2023).

The implication of these divergent perspectives on the effect of competitive intensity is that there are likely to be certain mitigating, firm-specific factors which determine the direction or nature of effect of competitive intensity on the performance for each particular firm. This underscores the complexity of competitive intensity and its far-reaching implications for business strategy and performance.

Competitive Intensity and Innovation Investment

It has been observed that the intense rivalry among information and communication technology firms has necessitated a continuous emphasis on innovation, ranging from service delivery to marketing strategies (Igwe *et al.*, 2024). This competitive environment has also compelled firms to invest in customer-centric solutions and employ new business models to differentiate themselves from their rivals. Cornett *et al.* (2019)

corroborated the fact that increased concentration increases the incentive to invest in innovation as a way to escape competition among fewer, but equally performing firms. In other words, under intense competition, firms increase innovation intensity to differentiate their products from those of their equally productive rivals. On the contrary, Tellis *et al.* (2009) asserted that where competition is excessively intense, firms would be faced with resource constraints which would limit their innovation investment.

Moreover, competitive intensity does not operate in isolation but interacts with other market forces and organizational factors. It is believed that those endogenous and exogenous factors often mediate the impact of competition on firm strategies and outcomes (Marín-Idárraga and Cuartas-Marín, 2019). On the whole, competitive intensity is a pivotal factor that shapes firm behaviour, particularly in dynamic and innovation-driven sectors such as the ICT sector. The influence of competitive intensity, as an inescapable variable in the business construct, extends beyond rivalry to encompass strategic decision-making, resource allocation, and innovation investments.

Innovation Investment and Performance

Innovation is regarded as one of the key aspects of an organization's success especially in the modern-day dynamic business environment (Urban and Verachia, 2019). Research has posited that innovations accelerate the growth of enterprises. This is because it is believed that consistently and strategically investing in innovation has the potential of creating faster opportunities for the investing firm to perform better and achieve sustainable growth (Krusinskas *et al.*, 2015).

Teece (2016) indicated that firms with sustained investment in innovation tend to exhibit superior adaptability and higher customer satisfaction, both of which have the potential of enhancing their performance. This is because sustained innovation enables firms to anticipate and respond effectively to market dynamics, technological disruptions, and competitive pressures. This adaptability allows firms to maintain relevance and leverage emerging opportunities, fostering resilience in volatile environments.

Moreover, innovation often leads to the development of unique products, services, and experiences that align closely with customer needs and preferences. This alignment with customer needs and preferences boosts customer satisfaction, enhances brand loyalty, and creates a competitive advantage. Mabenge *et al.* (2020) revealed that firms investing in continuous innovation experience better market positioning and increased customer retention. Similarly, Havar. (2019) asserted that such investments improve customer experience, thereby driving revenue growth and overall business success. These foregoing views in literature suggest that innovation could play a critical role in achieving long-term organizational sustainability and competitive performance.

Competitive Investment, Innovation Investment and Performance

Performance in fast evolving and dynamic sectors such as the ICT sector does not only depend on the firm's capacity to respond to competitive pressures but also on its ability to leverage strategies, such as innovation, to differentiate itself from competitors (Garrido-Moreno *et al.*, 2024). As earlier noted, competitive intensity serves as a catalyst for firms to invest in innovation, driving them to develop new products, enhance processes, and adopt advanced technologies to maintain or improve their market position (Han, 2013; Oliveira *et al.* 2022). This strategic investment enables firms to differentiate themselves, meet evolving customer demands, and respond effectively to market dynamics.

Bobillo *et al.* (2006) stated that innovation investments are critical in strengthening a firm's competitive edge by fostering unique innovation outputs. Such innovation investments often lead to the creation of intangible assets, which contribute significantly to the overall performance of investing firms. Similarly, Hameed *et al.* (2021) opined that innovation-driven firms not only enhance operational efficiency but also achieve superior financial outcomes due to increased adaptability and customer satisfaction. This suggests, from the standpoint of literature, that heightened competition stimulates innovation as a survival mechanism. The resulting advancements caused by that stimulation creates ripple effects that could improve both firm performance and sector-wide progress.

Theoretical Review

The Resource-Based View theory and Dynamic Capabilities theory are reviewed in this study. These two theories provide the theoretical framework for the study.

Resource-Based View Theory

The theory was developed by Jay Barney in 1991. Jay Barney leveraged on the foundational contributions from Penrose (1959) and Wernerfelt (1984) to develop the theory. Resource-Based View theory posits that firms achieve a competitive advantage and superior performance by possessing and utilizing valuable, rare, inimitable, and non-substitutable resources (Barney, 1991).

According to the theory, firms that possess unique assets, such as proprietary technology, skilled employees, or innovative capabilities, can create sustainable competitive advantages (Utami and Alamanos, 2023). This is because it is believed that these resources are challenging for competitors to replicate or substitute. This stance suggests that internal resources and inherent capabilities are the primary drivers of a firm's success rather than external market forces. The implication of this is that, if these resources are strategically managed, it can enable firms to perform better than their competitors.

From the foregoing review, it is evident that one of the limitations of Resource-Based View theory is that it tends to overlook the role of external factors, such as rapid industry changes or market shifts, which are particularly inescapable in fast-evolving sectors like the ICT sector. The theory also assumes that resources are relatively stable and controlled by the firm (Barney, 1991; Utami and Alamanos, 2023). The validity of this assumption is doubtful, particularly, in dynamic environments where firms have to promptly adapt to the changes in the external environment or stand the risk of being 'left behind' by its competitors (Madhani, 2010).

The Resource-Based View theory is relevant to this study because it supports the idea that innovation investment can be a strategic resource that enhances firm performance. The theory provides a theoretical basis for examining how firms that strategically invests in innovation, in response to competitive market pressures, can possibly achieve better performance.

Dynamic Capabilities Theory

The Dynamic Capabilities Theory was introduced by David Teece, Gary Pisano, and Amy Shuen in 1997. The theory states that a firm's ability to adapt, integrate and reconfigure its internal and external resources in response to changing environments is essential for sustaining competitive advantage (Teece *et al.*, 1997).

In furtherance of the Resource-Based View theory perspective, this theory emphasizes that in rapidly evolving markets, having unique resources is not enough. Firms must also develop dynamic capabilities to adapt these unique resources in response to environmental changes (Farzaneh *et al.*, 2022). Dynamic capabilities include strategic flexibility, rapid innovation, and the reconfiguration of resources (Teece, 2016). It is believed that firms with high dynamic capabilities can respond proactively to market shifts, technology advancements, and competition, allowing them to sustain performance and retain a competitive edge.

The Dynamic Capabilities theory is particularly instructive for firms operating in sectors that face continuous change. This is because it aligns with the reality that such firms must continuously evolve their resources and strategies to stay afloat. However, the challenge of operationalizing the theory has often been the issue of measuring dynamic capabilities, which is often intangible and difficult to quantify. This has therefore been a major critique of this theory (Easterby-Smith *et al.*, 2009). Also, the theory may overlook specific factors that contribute to these capabilities, such as firm culture or leadership.

Despite its limitations, Dynamic Capabilities Theory aligns with this study which focused on the mediating role of innovation investment. This is because the theory supports the idea that innovation investment acts as a dynamic capability that assists firms to manage and leverage market trends, thus positioning them to perform

better. Innovation investment can allow ICT firms to adapt to rapidly evolving technology and consumer demands, aligning with the need for strategic flexibility in a competitive environment.

The combination of these two related theories: Resource-Based View theory and Dynamic Capabilities Theory is relevant in providing the theoretical framework for this study. This is because while Resource-Based View theory explains why innovation investment can be a competitive asset, Dynamic Capabilities Theory elaborates on how firms can adapt this asset to respond effectively to external pressures and optimize their performance.

Empirical Review

In view of the centrality of innovations and the reality of competition in the dynamic global business environment, a number of empirical studies have been undertaken to examine how these business phenomena affect performance and other variables of business interest. Some of these studies are reviewed in this section.

Houngbonon and Jeanjean (2017) investigated the dynamic relationship between competition intensity and investment in the wireless industry using an ex post facto research design. The analysis was based on 2,770 observations from 110 wireless operators worldwide, spanning from 2005 to 2012. Firm-level data from four reputable databases were utilized for the study. The results of the OLS and Instrumental Variable-GMM estimation analyses showed an inverted-U relationship between competition and investment. This finding suggests that moderate competition optimizes investment, whereas excessive or insufficient competition undermines it. However, while the study provides useful information concerning the competition-investment relationship, its scope excluded African telecommunications firms, which face unique market structures and regulatory challenges. However, the mediating role of innovation investment in the relationship between competitive intensity and performance was not also considered in the study.

Cornett *et al.* (2019) examined the relationship between competitive environment and innovation intensity using ex post facto research design. Their study utilized secondary data from Compustat Fundamentals covering U.S. firms (excluding financials, utilities, and non-profits) from 1987 to 2016. The descriptive and inferential analysis that were carried out revealed a U-shaped relationship between industry concentration and innovation, suggesting that both high and low levels of industry concentration promote innovation while moderate concentration hampers it. This finding highlights the mechanism of competition in shaping firm innovation strategies. However, just like Houngbonon and Jeanjean (2017), the study is quite relevant to U.S. firms but its scope excludes ICT firms from developing economies like Nigeria, where market pressures and innovation drivers differ significantly from what is obtainable in the US.

Manalu *et al.* (2023) investigated the relationship between foresight capabilities (networking, time horizon, and analysis) and product innovation performance in SMEs, with competitive intensity as a moderating factor. Using primary data collected via structured questionnaires from SMEs in West Java Province, Indonesia, the study applied exploratory and confirmatory factor analysis (EFA and CFA) and structural equation modeling (SEM). The findings revealed that networking, time horizon, and analysis significantly influence product innovation performance. However, competitive intensity did not moderate the relationship between analysis and product innovation performance but it did for networking and time horizon. The study contributed to knowledge on foresight capabilities although its focus on SMEs in Indonesia limits the applicability of its findings to larger firms in other geographical and sectorial climes. The study used competitive intensity as a moderating factor but did not examine its relationship with firm performance through innovation investment as a mediator.

Mabenge *et al.* (2015) examined the effect of various dimensions of innovation on the performance of SMEs in Harare, Zimbabwe, with a focus on the moderating role of firm age and size. Based on survey research design which was adopted for the study, primary data were collected from 330 sampled SMEs through the administration of structured questionnaire. The structural equation modeling and moderated regression techniques were employed. The findings of the study revealed that innovation did not significantly impact either the financial or non-financial performance of firms. This finding suggests that innovation may not always be a strong driver of performance in SMEs, especially in contexts where other factors, such as

competition, market conditions or firm capabilities, might be more influential. However, the study did not take cognizance of the long term fluctuations in innovation and performance. Also, its focus on a single geographic region and the limited scope of SMEs could apparently impede the generalizability of the findings of this study to other fast evolving sectors such as the ICT sector in Nigeria.

Ndesaulwa and Kikula (2016) investigated the relationship between innovation and the performance of SMEs in Tanzania using a review of empirical studies published between 2005 and 2016. Employing a desktop and library research approach, secondary data from literature across global regions were reviewed. The findings of the study revealed inconsistent conclusions on whether innovation consistently influences firm performance. It is obvious from the review that most previous studies on innovation and the performance of SMEs were concentrated in Western, Middle Eastern, and Far Eastern regions. The observed limited evidence from African contexts underscored the need for African-specific research, since regional contexts may influence the relationship between innovation and performance. Also, the research approach adopted (desk-based) in the study did not provide new empirical perspectives on the relationship between innovation and performance.

Adio *et al.* (2018) examined the effects of innovative designs on the superior performance of telecommunication firms in Nigeria using a survey design. Drawing a sample of 383 respondents from 910 management staff of telecom operators in South-Western Nigeria, the study utilized primary data collected via a 5-point Likert scale questionnaire. Descriptive statistics and correlation analysis revealed a significant positive relationship between innovative designs and firm performance. The study concluded that innovation is a critical factor in achieving superior performance in telecommunication firms. The findings highlight the importance of innovative designs in enhancing firm performance, suggesting that investments in innovation can yield competitive advantages. However, it overlooked the potential mediating role of innovation investment in the competitive intensity-performance relationship. The regional scope of the study and its reliance on subjective data may not reflect the dynamics of Nigeria's ICT sector.

Zaman and Tanewski (2024) assessed the simultaneous relationships among R&D investment, innovation, and export performance using Australian firm-level longitudinal data from 17,335 firm-year observations (3,360 SMEs and 13,975 large firms) between 2006 and 2018. Drawing on data from tax filings, business registrations, intellectual property records, and various surveys, the study employed instrumental variable regressions and path analyses. The findings revealed a significant positive association between R&D activities, innovation, and export performance, highlighting R&D's pivotal role in driving international competitiveness and global market success. However, the scope of the study was limited to export performance and therefore did not consider other performance dimensions such as profitability or market share.

Osorio (2023) investigated the relationship between innovation investment and the generation of permanent employment in Colombia's manufacturing sector. Data from two surveys (EDIT Technological Development and Innovation Survey and the Annual Manufacturing Survey) for 2014–2015 were used. The study covered 6,284 companies across 33 subsectors. The findings of the multivariate regression analysis revealed that innovation investment, particularly in equipment, communication, and R&D, positively influences the permanent hiring of personnel, as organizations prioritize employees with valuable know-how to support their innovation strategies. This study highlights the employment benefits of innovation investment, suggesting that firms with robust innovation strategies are likely to create more stable employment opportunities. However, its focus on only manufacturing firms limits its applicability to other sectors that may have different competitive and innovation perspective. More so, it did not explore broader performance indicators beyond employment.

Alighanbari *et al.* (2022) studied the relationship between innovation investing and equity allocations. The focus was on how companies with new and disruptive technologies or products reshape market dynamics. The study concluded that firms driving technological advancements often gain market share at the expense of incumbents, influencing equity index compositions over time. This highlights the significant role of innovation in determining firm competitiveness and its subsequent impact on investor portfolios. This finding suggests that disruptive innovation is a key driver of market evolution, emphasizing its importance for both corporate strategy and investment decisions. The scope of the study was on market evolution and equity changes, it did not cover how innovation investment affects performance dimensions such as profitability or market share.

Igwe *et al.* (2024) investigated the relationship between service system innovation and competitiveness in Nigeria's mobile telecommunications sector, with managerial competencies as a moderating factor. Using a cross-sectional survey design, data were collected from 451 respondents through Google Forms and analyzed using partial least squares structural equation modeling (PLS-SEM). The findings revealed that service system innovation (comprising idea development, service development, and commercialization) significantly enhances the competitiveness of mobile telecommunication firms. Additionally, managerial competencies were found to strengthen the relationship between service system innovation and competitiveness. This study sheds light on how managerial competencies enhance the impact of service system innovation on competitiveness in Nigeria's mobile telecommunications sector. Its reliance on cross-sectional data restricts its ability to capture dynamic competitive trends. Moreover, the study did not explore the mediating role of innovation investment in the relationship between competitive intensity and firm performance, which could be critical for understanding how firms in Nigeria's ICT sector adapt to sustained competitive pressures.

Marín-Idárraga and Cuartas-Marín (2019) investigated the influence of competitive intensity and organizational slack on the relationship between innovation and performance in small and medium-sized enterprises (SMEs) in Bogotá, Colombia. The cross-sectional survey design was adopted for the study. Data were collected through questionnaires and analyzed using structural equation modeling and path analysis. The findings revealed that the impact of innovation on performance is contingent on the presence of precursor variables like competitive intensity and organizational slack. The study highlighted the role of competitive dynamics and internal resources in fostering innovation success but it did not consider the mediating role of innovation investment in explaining how firms sustain performance in highly competitive and technologically driven markets. More so, the limitation of the cross-sectional approach that was adopted in the study underscores the need for a longitudinal and sector-specific perspective of analysis.

Hajar *et al.* (2022) examined the effect of value innovation on the superior performance and sustainable growth of Yemeni mobile service providers, highlighting the mediating roles of customer satisfaction and loyalty. Survey data collected via a five-point Likert scale questionnaire which was administered to 304 employees. The data were analyzed using partial least squares structural equation modeling (PLS-PM). The researchers found out that value innovation positively influenced customer satisfaction and sustainable growth, while customer loyalty positively impacted firm performance and sustainable growth. Additionally, customer satisfaction was shown to enhance customer loyalty. These findings underscore the importance of value innovation and customer-centric strategies in achieving sustainable growth. However, the study relied on an employee-only perspective which limits its generalizability. The researchers did not also consider how competitive intensity integrates with innovation investment to affect firm performance.

Lartey *et al.* (2020) conducted a study on the link between innovation, market orientation, and performance in the telecommunications sector in Ghana, focusing on the mediating role of innovation. Structured questionnaires distributed to managers and employees of three major telecommunications firms in Accra were used. The data were analyzed using structural equation modeling. The findings of the study revealed that innovation positively influenced performance, while market orientation strongly correlated with creativity, ultimately enhancing firm efficiency. These findings emphasize the critical role of market orientation and innovation in driving performance. Competitive intensity was not specifically investigated in the study. Market orientation which was used in this study is slightly different from competitive intensity. The study relied on subjective primary data that were collected from a single city.

Zhang and Jedin (2023) investigated the moderating role of competitive intensity in the relationship between firm capabilities (innovation and technical) and export performance among Chinese smartphone manufacturing exporters. Primary data were collected via online questionnaires from 162 manufacturer-exporter firms and analyzed through structural equation modeling (Smart-PLS). The study revealed that competitive intensity significantly moderated the positive link between technical capability and export performance but did not influence the relationship between innovation capability and export performance. These findings portrayed the role of competitive intensity in shaping firm performance outcomes. The focus of the study was on export-oriented firms in manufacturing sector only which may limit its broader applicability.

GAP IN LITERATURE

The Dynamic Capabilities theory and Resource-Based View theory provided the theoretical foundation for the study. However, in the course of the review, it was observed that studies that integrate these two theoretical perspectives to examine how innovation investment operates as a mechanism through which competitive intensity influences ICT firm performance are relatively scarce. This suggests that there is a limited theoretical understanding of how competitive intensity influences firm performance through innovation investment, especially in Nigeria's ICT sector.

The methodological perspective of this study deviates from most other studies. The review of literature indicated that apart from Hounbonon and Jeanjean (2017), Cornett *et al.* (2019) and few others, many of the other studies reviewed were cross sectional studies which employed structural equation modeling analysis of subjective data that were collected through questionnaire-based surveys. In order to ascertain the generalizability of such study findings, there was a need for a study that adopts a broader longitudinal scope based on an objective and verified secondary data to examine the mediating role of innovation investment, in explaining the relationship between competitive intensity and firm performance. Also, most of the studies on innovation found in literature, adopted patent or R&D as proxy for innovation (Bobillo *et al.*, 2006; Guney *et al.*, 2017; Osorio, 2023; Mezzanotti and Simcoe, 2023). The suitability of these proxies has been severally criticized in literature. Some of these researchers alluded to these criticisms, as a limitation of their study (Cui *et al.*, 2021). This study intends to adopt a different measure for innovation investment which was earlier used by Hounbonon and Jeanjean (2017).

In line with the observation of Ndesaulwa and Kikula (2016), most of the studies reviewed were conducted in European, American and Asian countries. Apart from the study by Igwe *et al.* (2024), none of the other researches reviewed in this study had a Nigerian context. Moreover, those foreign based studies did not focus on ICT sector in Nigeria. Some of them were centred on SMEs (Mabenge *et al.*, 2020; Manalu *et al.*, 2023), services sector (Anning-Dorson and Nyamekye, 2020) and manufacturing sector (Zhang and Jedin, 2023). Given the peculiar competitive realities of Nigeria's ICT sector, this empirical gap justifies a study on the mediating role of innovation investment on the relationship between competitive intensity and performance of ICT firms, within the Nigerian context.

METHODOLOGY

The *ex post facto* research design was adopted for the study. This design was deemed appropriate because it relied on objective and unbiased data extracted from verifiable records (annual reports), which had been attested to by professional auditors *vis a vis* the audit process.

The population of the study comprised all the ICT sector firms that were listed on the Nigerian Exchange Group (NGX) as at November 30, 2024 (NGX, 2024). The census sampling technique was adopted for the study. This is because the listed ICT firms were not many and as such there was no reasonable justification for any further selection to be made from the population. Thus, the population of eight (8) listed ICT firms was adopted as the sample for the study.

Secondary data were used for this study. These data were specifically extracted from the Statement of Financial Position, Statement of Profit or Loss, and Statement of Cashflows of each of the eight ICT firms for the period of 12 years (2012 – 2023). This gave rise to a panel data structure for the study. However, the panel dataset was unbalanced because some of the firms that were incorporated or listed after 2012, did not have data for some of the years covered in the study. Due to this imbalance, the total number of observations, excluding these missing values, were 82 observations. This however did not affect the study as a suitable modelling and analysis approach was adopted to mitigate any possible effect of this imbalance.

Models Specification

In order to achieve the objectives of the study, four random effect (RE) regression models were specified to represent the hypothesized relationships among the variables. The random effect modeling approach was

adopted in order to control for unobserved individual characteristics of the different ICT firms which are not usually considered in the commonly used pooled regression model approach. The motivating essence of this approach was to mitigate potential bias in the results of the study. In other to empirically verify the suitability of the random effect model over the fixed model alternative, a Hausman test was conducted and the results of the test is presented in Table 1.

Table 1: Hausman Test of Cross-section Random Effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	8.799136	5	0.1173

Source: Researcher's Computation (2024)

The p value of the chi square statistic at 5 degree of freedom (0.1173) was greater than 0.05. This insignificant p value indicate that random effects model was a better model for this study. The models of the study were initially expressed in their basic functional form as follows:

PEFM = f (CMPT) for hypothesis one (Ho₁)

IINV = f (CMPT) for hypothesis one (Ho₂)

PEFM = f (IINV) for hypothesis one (Ho₃)

PEFM = f (CMPT, IINV) for hypothesis one (Ho₄)

Where:

PEFM – Performance

IINV – Innovation Investment

CMPT – Competitive intensity

Gleanings from studies by Rafiq *et al.* (2016), Howard (2022) and, Zaman and Taneski (2024) respectively, motivated the inclusion of Firm age (FAGE), Inflation rate (INFL), and Firm size (FSZE) as control variables in this study. Thus, with the introduction of these control variables, constant, coefficients and the error term, the models were ultimately expressed in econometric form as follows:

$PEFM_{it} = \Omega_0 + \Omega_1 CMPT_{it} + \Omega_2 FSZE_{it} + \Omega_3 FAGE_{it} + \Omega_4 INFL_t + \nu_j + \varepsilon_{it}$ Model 1

$IINV_{it} = \beta_0 + \beta_1 CMPT_{it} + \beta_2 FSZE_{it} + \beta_3 FAGE_{it} + \beta_4 INFL_t + \nu_j + \varepsilon_{it}$ Model 2

$PEFM_{it} = \gamma_0 + \gamma_1 IINV_{it} + \gamma_2 FSZE_{it} + \gamma_3 FAGE_{it} + \gamma_4 INFL_t + \nu_j + \varepsilon_{it}$ Model 3

$PEFM_{it} = \alpha_0 + \alpha_1 CMPT_{it} + \alpha_2 IINV_{it} + \alpha_3 FSZE_{it} + \alpha_4 FAGE_{it} + \alpha_5 INFL_t + \nu_j + \varepsilon_{it}$ Model 4

Where:

$\Omega_0, \beta_0, \gamma_0, \alpha_0$, = Intercept for model 1, model 2, model 3 and model 4 respectively

$\Omega_1, \Omega_2, \Omega_3, \Omega_4$ - Coefficients of the independent and control variables for model 1

$\beta_1, \beta_2, \beta_3, \beta_4$ - Coefficients of the independent and control variables for model 2

$\gamma_1, \gamma_2, \gamma_3, \gamma_4$ - Coefficients of the independent and control variables for model 3

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ = Coefficients of the independent and control variables for model 4

$PEFM_{it}$ – Performance of firm i in year t

$IINV_{it}$ – Innovation investment of firm i in year t

$CMPT_{it}$ – Competitive intensity of firm i in year t

$FSZE_{it}$ – Firm size of firm i in year t

$FAGE_{it}$ – Firm age of firm i in year t

$INFL_t$ – Inflation rate in year t

η_i – random effect unique to firm i , assumed to be constant over time

ε_{it} – idiosyncratic error term for firm i in year t

Description of Variables

The variables for this study are competitive intensity (independent variable), innovation investment (mediating variable) and performance (dependent variable). Firm size, firm age and Inflation rate were included as control variables. In order to enhance clarity and comprehension, the various ratios and indices that were adopted as measurement proxies for the variables of the study are described and summarized in Table 2

Table 2: Variable Description and Measurement

Variables	Denotation	Proxy (Measurement)	Apriori expectation
Dependent			
Performance	PEFM	Natural Log of the profit for the year	
Independent Variable			
Competitive intensity	CMPT	$1 - (\text{EBITDA} / \text{Revenue})$	(-)
Mediating Variable			
Innovation investment	IINV	Natural log of aggregate cash outflow from investment in PPE and intangible assets	(+)
Control Variables			
Firm Size	FSZE	Natural Log of Total Assets	(+)
Firm Age	FAGE	Natural Log of firms' years of existence after incorporation	(+)
Inflation rate	INFL	Annual rate as reported by the World Bank Data site	(-)

Source: Researchers' Compilation (2024)

Data Analysis Technique

Relevant descriptive statistic (mean, median, maximum, minimum, standard deviation, skewness and kurtosis) were employed in describing the data. Random effect (RE) regression analyses technique was employed in the inferential analyses of the data. All inferential analyses were done using E-views 10.0. The hypotheses of the study were tested at 95% confidence level. The corresponding p-value of each variable's t-statistic was

compared with the specified significance level of 5%. The first three hypotheses (H_{01} , H_{02} and H_{03}) were tested based on the p-value of the t-statistic. Thus, a null hypothesis was supported if the p-value of the t-statistic was less than 0.05, and vice versa. In the case of hypothesis four (H_{04}), the Sobel Test was conducted to determine the mediation effect of innovation investment and its statistical significance.

RESULTS AND DISCUSSION OF FINDINGS

Statistical Analysis of Data

The data collected during the study were analyzed using mean, median, maximum, minimum and standard deviation. The skewness and kurtosis of the data were also analyzed.

Table 3: Descriptive Statistics

	PERF	CMPT	IINV	FAGE	FSZE	INFL
Mean	4.264113	42.83251	5.516947	3.046631	9.511248	0.143093
Median	4.849500	0.971550	5.470000	3.091000	9.033550	0.132500
Maximum	12.76200	3083.900	13.23000	4.317500	14.97520	0.246600
Minimum	0.000000	0.461500	-3.510000	0.693100	6.648300	0.080500
Std. Dev.	4.060720	340.5292	3.448322	0.762936	1.949118	0.047874
Skewness	0.588303	8.845575	0.221092	-0.563155	1.554607	0.677069
Kurtosis	2.381333	79.49365	3.754676	3.701707	4.811724	2.793140
Sum	349.6573	3512.266	452.3897	249.8238	779.9223	11.73360
Sum Sq. Dev.	1335.645	9392770.	963.1648	47.14781	307.7238	0.185645
Observations	82	82	82	82	82	82

Source: Researcher's Computation (2024)

The descriptive statistics in Table 3 shows that the study comprised a total of 82 observations. Ideally, the product of the number of listed ICT firms (8) and the period scope of the study (12 years) ought to have resulted in 96 observations. However, 14 observations were not captured due to the fact that some of the firms did not have data for some of the years covered in the study. This resulted in an unbalanced dataset with 82 observations.

The mean for the dependent variable (PERF) is 4.264113 while CMPT and IINV has mean of 42.83251 and 5.516947 respectively. The mean for the control variables: FAGE, FSZE and INFL, are 3.046631, 9.511248 and 0.143093 respectively. The median of IINV (5.470000) is quite close to its mean (5.516947) unlike CMPT which has a mean of 42.83251 and a median of 0.971550. Out of the three focal variables of the study, CMPT has the highest maximum value (3083.900) followed by IINV (13.23000) and PERF (12.76200). The maximum and minimum value of the control variables are: FAGE (4.317500 and 0.693100), FSZE (14.97520 and 6.648300) and INFL (0.246600 and 0.080500) respectively. This data range result in a standard deviation of 4.060720, 3.448322, 0.762936, 1.949118 and for PERF, IINV, FAGE and FSZE respectively. CMPT which has the highest mean and maximum also has the highest standard deviation (340.5292) while a control variable (INFL) has the lowest standard deviation (0.246600). These relatively higher standard deviation value of CMPT is clearly as a result of the extremely wide dispersion observed between the minimum and maximum values of the variable as presented in Table 3

The skewness values computed in this descriptive statistic provides an indication of the symmetry of the data distribution. According to Table 3 skewness value of 0.588303, 8.845575, 0.221092 are obtained for PERF,

CMPT and IINV respectively while FAGE, FSZE and INFL had a skewness of -0.563155, 1.554607 and 0.677069 respectively. This indicates that PERF, CMPT and IINV, FSZE and INFL are skewed to the right (positively skewed) while FAGE is skewed to the left (negatively skewed). The kurtoses values of IINV (3.754676), FAGE (3.701707) and FSZE (4.811724) depict leptokurtic distributions. CMPT is extremely leptokurtic (79.49365) while PERF (2.381333) and INFL (2.793140) are platykurtic.

Normality

The probability values of Jarque-Bera statistic for the individual variables of the study are used to assess the normality of the dataset. The summary of the result from this statistic is presented in Table 4.

Table 4: Normality Test

	PERF	CMPT	IINV	FAGE	FSZE	INFL
Jarque-Bera	6.037774	21061.20	2.613961	6.016630	44.24432	6.411308
Probability	0.048856	0.000000	0.270636	0.049375	0.000000	0.040532

Source: Researcher's Computation (2024)

The mediating variable (IINV) has a very high probability of 0.270636. The probability of PERF (0.0048856) and FAGE (0.049375) reasonably approximates to 0.05. INFL has a probability of 0.040532. In summary, the information in Table 4 indicates that, apart from CMPT and FSZE which obtains the same probability of 0.0000, the probability of the Jarque-Bera statistic for all the variables of the study approximately meet the minimum threshold of 0.05. This is an indication that distribution is fairly normal and reasonably suitable for multiple regression analysis.

Multi-Collinearity

Multi-collinearity test is based on the value of the Variance Inflation Factor (VIF) as shown in Table 4.3.

Table 5: Collinearity Test

	CMPT	IINV	FAGE	FSZE	INFL
VIF	1.143	2.906	2.759	1.097	1.112

Dependent Variable: PERF

Source: Researcher's Computation (2024)

According to Table 5, the VIF value for the independent variable (CMPT) is 1.143 for 2.906 for the mediating variable (IINV). The control variables – FSZE, FAGE and INFL have VIF values of 2.759, 1.097 and 1.11. There are no multi-collinearity concerns since all the VIF values were less than 10. These results indicate that the multi-collinearity assumption is not violated

Heteroscedasticity

Table 6: Heteroscedasticity Likelihood Ratio Tests

Panel Cross-section Heteroscedasticity LR Test				
Null hypothesis: Residuals are homoscedastic				
	Value	df	Probability	
Likelihood ratio	24.53786	8	0.0019	

Source: Researcher's Computation (2024)

According to Table 6, the likelihood ratio (24.53786) at 8 degrees of freedom has a probability of 0.0019. Since the probability of test is less than the significance level (0.05), the null hypothesis of the heteroscedasticity test is therefore not supported. Thus, the residuals in the regression model are heteroscedastic. This means that the variance of the errors in the model is not the same for all observations.

Presentation and Analysis of Empirical Results

The E-views regression results presented in Table 7 to Table 11 are used as the bases of testing the hypotheses of the study. As earlier indicated, the hypotheses are either supported or not supported based on the p-value of the estimates.

Empirical Results on the Relationship between Competitive Intensity and Performance

H₀₁: There is no significant relationship between competitive intensity and performance of listed ICT firms in Nigeria

Table 7: RE Panel Regression Output on CMPT and PERF

Dependent Variable: PERF				
Method: Panel EGLS (Cross-section random effects)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.73458	2.46393	-0.70399	0.4836
CMPT	-4.85E-05	0.00099	-0.04887	0.9612
FSZE	1.197504	0.20241	5.91614	0.0000
FAGE	-1.16596	0.4958	-2.35167	0.0212
INFL	-12.8372	6.96807	-1.84229	0.0693
R-squared	0.427765			
S.E. of regression	3.04778			
F-statistic	9.170076	Durbin-Watson stat		1.806841
Prob(F-statistic)	0.000004			
			S.D.	Rho
Cross-section random:			0.67287	0.0519
Idiosyncratic random			2.87734	0.9481

Source: Researcher's Computation (2024)

The output of the random effect panel regression analysis on the relationship between competitive intensity (CMPT) and performance (PERF) of listed ICT firms in Nigeria is summarized in Table 7. According to the result, the p value of the F statistic (0.000004) is less than 0.05. This denotes that the model is effective in explaining the variation in the dependent variable (PERF). This means that the model has a good fit and thus the results generated from it, can be relied upon as a basis for inference on the relationship between competitive intensity and performance of listed ICT firms in Nigeria. Researchers generally accept a Durbin-Watson statistic between 1.5 and 2.5 as indicative of no serious autocorrelation (Gujarati and Porter, 2009). Since the value of 1.806841 falls within this range, it indicates that there is no serious autocorrelation issue.

From the results in Table 7, the R squared (0.427765) indicates that competitive intensity explains approximately 42.78% of the variation in performance of listed ICT firms in Nigeria. This implies that 57.22 % of variations in performance of listed ICT firms in Nigeria are explained by other variables. The cross-section random Rho value of 0.0519 shows that approximately only 5.19% of the variance in performance of these firms highlighted in this regression result is attributable to differences across firms. This is confirmed by the idiosyncratic random Rho (0.9481) which shows that. 94.81% of the variability in ICT firms' performance is due to factors that change within each of the firms over time, rather than differences among firms. The standard deviation of the idiosyncratic random effect (2.87734) indicates a significant variation within the firms over time.

The regression coefficient for CMPT (-4.85E-05) confirms the *a priori* expectation that that there is a negative relationship between the variables. The t statistic of CMPT ($t_{0.05} = -0.048869$) is not significant as its p value (0.9612) is greater than 0.05 threshold. Based on this fact, the null hypothesis (H_{01}) is supported. Thus, there is no significant relationship between competitive intensity and performance of listed ICT firms in Nigeria.

Empirical Results on the Relationship between Competitive Intensity and Innovation Investment

H_{02} : There is no significant relationship between competitive intensity and innovation investment of listed ICT firms in Nigeria.

Table 8: RE Panel Regression Result on CMPT and IINV

Dependent Variable: IINV				
Method: Panel EGLS (Cross-section random effects)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.372842	1.32549	-4.80793	0.0000
CMPT	0.001541	0.00059	2.62849	0.0103
FSIZE	1.369568	0.099576	13.75399	0.0000
FAGE	-0.816403	0.25249	-3.23336	0.0018
INFL	8.978661	4.15151	2.16275	0.0337
R-squared	0.655862			
S.E. of regression	2.074777			
F-statistic	36.6868	Durbin-Watson stat		1.32134
Prob(F-statistic)	0.0000			
			S.D.	Rho
Cross-section random			0.0000	0.0000
Idiosyncratic random			1.73148	1.0000

Source: Researcher's Computation (2024)

The F statistic of the model explaining the relationship between competitive intensity (CMPT) and innovation investment (IINV) has a value of 36.6868 with a p value of 0.0000, as shown in Table 8. Since the p value of F statistic is less than the 0.05 threshold, this statistic therefore depicts that the model is significant in explaining the variation of the dependent variable (IINV). Thus, the regression model was deemed to be significantly fit and suitable for the purpose of inference on the relationship between the two variables (CMPT and IINV). The Durbin Watson statistic of 1.321335 suggests mild positive autocorrelation. The R squared (0.6555862)

indicates that up to 65.59% of the variations in innovation investment of listed ICT firms in Nigeria was explained by competitive intensity. This means that, apart from competitive intensity, other variables which were not included in this model, account for only 34.41 % of the variations in the innovation investment of these firms.

Also, from the results, the idiosyncratic Rho (1.0000) as well as the cross-section random effects S.D. and Rho value of 0.0000 shows that there was no cross-sectional variance rather, 100% of the variability in ICT firms' performance was due to factors that changed within each of the firms over the period of the study. The regression coefficient for CMPT (0.001541) shows a positive relationship between competitive intensity and the performance of listed ICT firms in Nigeria over the study period. The null hypothesis (H_{02}) which states that there is no significant relationship between competitive intensity and innovation investment of listed ICT firms in Nigeria is not supported. This is because the t statistic of CMPT in Table 8 ($t_{0.05} = 2.628492$) is statistically significant ($p = 0.0103$, $p < 0.05$) at 5%.

Empirical Results on the Relationship between Innovation Investment and Performance

H_{03} : There is no significant relationship between innovation investment and performance of listed ICT firms in Nigeria.

Table 9: RE Panel Regression Result on IINV and PERF

Dependent Variable: PERF				
Method: Panel EGLS (Cross-section random effects)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.145378	2.68816	-0.05408	0.957
IINV	0.256556	0.15898	1.61379	0.1107
FSIZE	0.861789	0.2867	3.00585	0.0036
FAGE	-0.963384	0.53062	-1.8156	0.0733
INFL	-15.87778	7.00698	-2.26599	0.0263
R-squared	0.454057			
S.E. of regression	2.980321			
F-statistic	8.921283	Durbin-Watson stat		1.586152
Prob(F-statistic)	0.000006			
			S.D.	Rho
Cross-section random			0.78609	0.0695
Idiosyncratic random			2.87671	0.9305

Source: Researcher's Computation (2024)

Table 9 contains the random effect regression output on the significant relationship between innovation investment (IINV) and performance (PERF) of listed ICT firms in Nigeria. The Durbin Watson statistic is 1.5586162 fell within the range of 1.5 to 2.5, implying that there is no serious issue of autocorrelation. The model is statistically fit for the purpose of the study because the F statistic, as shown in Table 9, is significant at 5% ($F = 8.921283$, $p = 0.000006$, $p < .005$). This denotes that the model is significant and reliable for the analysis and inference on the relationship between IINV and PERF. The value of R squared (0.454057) implies that about 45.41% of the variations in the performance of the listed ICT firms in Nigeria are explained by the

level of innovation investment. This means that 54.59 % of those variations are attributable to other variables outside the model.

The cross-section random Rho value of 0.0695 shows that approximately only 6.95% of the variance in performance of the listed ICT firms was attributable to inter-firm differences during the period. This is confirmed by the idiosyncratic random Rho (0.9305) which shows that a greater percentage (93.05%) of the variability in ICT firms' performance is due to firm-specific factors that changed within each of the firms over the period covered by this study. The standard deviation of the idiosyncratic random effect (2.876706) indicates a significant variation within the firms over time.

In Table 9, the regression coefficient for IINV is 0.256556. This corroborates the *a priori* expectation of a positive relationship between the between innovation investment and performance of listed ICT firms in Nigeria. The t statistic value for IINV shows that this relationship was not significant ($t_{0.05} = 1.613793$, $p = 0.1107$, $p < 0.05$). Based on this statistic, the null hypothesis (H_{03}) is supported. This implies that there is no significant relationship between innovation investment and performance of listed ICT firms in Nigeria.

Empirical Results on the Relationship between Competitive Intensity, Innovation Investment and Performance

H_{04} : Innovation investment does not significantly mediate the relationship between competitive intensity and performance of listed ICT firms in Nigeria.

Table 10: RE Panel Regression Result on CMPT, IINV and PERF

Dependent Variable: PERF				
Method: Panel EGLS (Cross-section random effects)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.093879	2.8559	0.03287	0.9739
CMPT	-0.000408	0.001063	-0.383746	0.7022
IINV	0.255012	0.170698	1.493946	0.1393
FSZE	0.812102	0.314808	2.579677	0.0118
FAGE	-0.921792	0.584380	-1.577384	0.1189
INFL	-14.98927	7.223922	-2.074949	0.0414
R-squared	0.454917			
S.E. of regression	2.969643			
F-statistic	5.481083	Durbin-Watson stat		1.615245
Prob(F-statistic)	0.000232			
			S.D.	Rho
Cross-section random			1.01248	0.1088
Idiosyncratic random			2.89743	0.8912

Source: Researcher's Computation (2024)

The R squared value of 0.454917 in Table 10 depicts that 45.49 % of the variation in performance of ICT firms is jointly explained by the model. The model's goodness of fit is established by the F statistic (5.481083) which has a significance of 0.000232. There are also no major autocorrelation concerns (Durbin Watson = 1.615245). The respective coefficients of CMPT and IINV (-0.000408 and 0.255012) still indicates a negative and positive relationship with performance, respectively as was earlier observed in Sections 4.1.3 and 4.3.3. The respective p values of the t statistic of CMPT and IINV (0.7022 and 0.1393) are also both insignificant at 0.05.

Table 11: Mediation Analysis

		IINV not included (β_1)	IINV included (α_1)	Difference ($\beta_1 - \alpha_1$)
Coef CMPT		-4.85E-05	-0.000408	0.0003595
p value		0.9612	0.7022	0.259
Sobel Statistic	1.3754451			
Std. Error	0.0002874			
p value	0.1689935			

Source: Researcher's Computation (2024)

Table 11 indicates the mediating effect of innovation investment on the relationship between competitive intensity and performance of listed ICT firms in Nigeria. The difference between the partial regression coefficient of competitive intensity after inclusion of innovation investment (-0.000408) and the regression coefficient of competitive intensity without the inclusion of innovation investment (-4.85E-05) is 0.0003595. This positive difference (0.0003595) implies that innovation investment partially mediates the relationship between competitive intensity and firm performance.

Also, it is evident from the results in Table 11 that the p value of the initial coefficient (β_1) of CMPT (0.9612) reduced by 0.259 after the inclusion of IINV in the model. According to Beers (2024), the lower the p value, the higher the statistical significance of an estimate. In view of this, the relatively lower p value of CMPT after the introduction of IINV (0.7022) implies that after controlling for the effect of firm size, firm age and inflation rate, innovation investment increases the significance of the negative relationship between competitive intensity and performance of the listed ICT firms in Nigeria.

Based on the result in Table 11, the p value of Sobel test ($p = 0.1689935$, $p > 0.05$) is statistically insignificant at 0.05, the null hypothesis is therefore supported. Thus, there is a positive mediating effect of innovation investment on the relationship between competitive intensity and performance of listed ICT firms in Nigeria is not significant.

DISCUSSION OF THE FINDINGS

In this section, the focus is on discussing the main findings deduced from the results of the empirical analysis conducted in this study.

Relationship between Competitive Intensity and Firm Performance

The hypothesis on the relationship between competitive intensity and performance of ICT firms in Nigeria was tested in this study. The result of the analysis in Table 7 depicts an insignificant negative relationship between competitive intensity and performance of the ICT firms ($t = -0.048869$, $p = 0.9612$, $p > 0.05$). The result also indicates that when the variance in performance explained by firm size, firm age and inflation rate, competitive intensity is controlled for, competitive intensity makes a 42.78% unique contribution to explaining the

performance of ICT firms in Nigeria. The coefficient however indicates that the effect of an increase in competitive intensity on the performance of these firms was quite infinitesimal ($4.85E-05$).

This finding contrasts with that of Porter (2008) who stated that competitive intensity drives firms to innovate and improve efficiency which enhances their performance. The deviation observed in this previous study could be attributed to differences in measurement of variables, or the specific characteristics of the Nigerian ICT sector. Besides, the inclusion of control variables such as firm size, firm age, and inflation may have also influenced the outcomes.

However, the findings of this study align with the findings by Hounghonon and Jeanjean (2017), who posited that in certain contexts, intense competition may strain resources thereby limiting performance improvements. Similarly, Ogunmuyiwa (2022) reported that environmental factors, including competitive intensity, significantly influence the performance of ICT firms in Nigeria. Given this finding, it is evident that as competition gets more intense in the ICT sector, the performance of firms in this sector will be affected, though not significantly.

Relationship between Competitive Intensity and Innovation Investment

The result of hypothesis two test indicates that competitive intensity makes a statistically significant positive contribution of 65.59 % in explaining the variation in innovation investment of listed ICT firms in Nigeria ($R^2 = 0.655862$, $p = 0.0103$, $p > 0.05$). The finding from the coefficient (0.001541) implies that when the effect of firm size, firm age and inflation rate on performance of ICT firms in Nigeria is controlled, a 1% increase in the competitive intensity could increase innovation investment of these firms by 0.1%. The positive relationship may reflect the dynamic and rapidly evolving nature of the ICT industry in Nigeria, where firms must innovate to keep pace with technological advancements and market demands

Also, although it is undebatable that listed firms in Nigeria's ICT sector have their different individual, firm-specific characteristics, the findings of this study reveal that the relationship magnitude between competitive intensity and their innovation investment is not affected at all by such inter-firm differences. This was highlighted by the cross section random effect analysis ($SD = 0.0000$, idiosyncratic $Rho = 1.0000$) which shows that differences across the ICT firms do not contribute at all to the variation in innovation investment rather the observed variations are as a result of unique changes that happened within each of the firms.

The finding of this study aligns with the view of Cornett *et al.* (2019) and Igwe *et al.* (2024), that firms in highly competitive environments are driven by the competition to invest in innovation as a survival strategy. This relationship supports the notion that competition fosters innovation by driving firms to differentiate and improve their products and services.

However, it is pertinent to also note that the findings of this study deviates from findings by Tellis *et al.* (2009), who argued that excessive competition may hinder innovation investment due to resource constraints. The divergence of this study findings from that of Tellis *et al.* (2009) is an indication of the peculiar characteristics of the Nigerian ICT sector. This study suggests that in Nigeria ICT sector, competitive intensity serve as a catalyst for innovation rather than a deterrent. This underscore the critical role of competitive pressure in driving innovation investment in Nigeria

Relationship between Innovation Investment and Firm Performance

The result of the analysis of the relationship between innovation investment and firm performance reveals a positive relationship. According to the result, 1% increase in innovation investment can generate a 25.66 % increase in the performance of listed ICT firms in Nigeria. This buttresses the point that innovation investment plays a critical role of in driving ICT firm performance in Nigeria. After controlling for the effect of firm size, firm age and inflation rate, innovation investment explained 45.41% of the variation in the performance of ICT firm during the period. It is worthy of note that, the perceivable differences between firms in the ICT sector does not contribute much to the variations in this relationship (Cross-section random $Rho = 0.0695$).

Hagedoorn and Wang (2012) had emphasized the role of innovation in fostering long-term performance gains. Otache (2024) had also observed a positive relationship between innovation capability and performance of SMEs. However, the outcome of this study reveals that despite the fact that innovation investment has a positive relationship with performance in Nigeria's ICT sector, the relationship is not statistically significant ($t_{0.05} = 1.613793$, $p = 0.1107$, $p < 0.05$). This finding is in line with that of Mabenge *et al.* (2020) but it is not consistent with the view of Ayyagari *et al.* (2011) who stated that innovation significantly enhances firm performance, particularly in emerging markets, by improving productivity and competitiveness.

The deviation in findings observed in this study could be attributed to unique contextual factors within the Nigerian ICT sector, such as regulatory constraints, or the scale of innovation investment. The insignificance might also stem from the time lag between innovation investment and its observable impact on performance, which may not be fully captured in the timeframe covered by this study. Additionally, other mediating or moderating factors not included in the model, such as organizational capabilities or external economic shocks, could also influence the relationship.

Effect of Competitive Intensity on the Relationship between Innovation Investment and Performance

The hypothesis on the mediation effect of innovation investment on the relationship between competitive intensity and performance of listed ICT firms in Nigeria is tested in this study. Moreover, prior to the mediation effect analysis, which is the focus of the analyses in hypothesis 4, the joint relationship between competitive intensity, innovation and performance of ICT firms in Nigeria is highlighted by the results. According to Table 11, competitive intensity and innovation investment (along with the control variables) jointly explain 45.49% of the observed variations in the performance of these firms. This implies that 54.51% of those variations are accounted for by other variables outside those that are considered in this study (R^2 squared 0.454917).

The outcome of the mediation analysis indicates that the relatively lower p value of CMPT after the introduction of IINV (0.7022) implies that after controlling for the effect of firm size, firm age and inflation rate; the statistical significance of the negative relationship between competitive intensity and performance of the listed ICT firms in Nigeria was increased by innovation investment. The Sobel test indicates that innovation investment partially mediates the effect of competitive intensity on performance. Its mediating effect was however, statistically insignificant. This means that innovation investment partially reduces the negative effect of competitive intensity on performance.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of the Findings

The focus of this study is on the mediating effect of innovation investment on the relationship between competitive intensity and performance of the eight listed ICT firms in Nigeria between 2012 and 2023. The four tentative propositions earlier put forward to guide the study have been empirically tested based on the output of E-views regression analyses. The findings from these analyses are as follows:

- i. There is an insignificant negative relationship between competitive intensity and performance of listed ICT firms in Nigeria.
- ii. There is a significant positive relationship between competitive intensity and innovation investment of listed ICT firms in Nigeria.
- iii. There is an insignificant positive relationship between innovation investment and performance of listed ICT firms in Nigeria.
- iv. Innovation investment partially mediates the negative relationship between competitive intensity and performance of listed ICT firms in Nigeria. The mediating effect is statistically insignificant.

Conclusion

The mediating effect of innovation investment on the relationship between competitive intensity and performance among listed ICT firms in Nigeria was examined in this study. The findings of the study reveal an insignificant negative relationship between competitive intensity and firm performance. This suggests that heightened competition may not directly lead to improved outcomes. However, a significant positive relationship between competitive intensity and innovation investment has been observed. This highlights the fact that competitive pressures have the potential of encouraging firms to invest in innovation. Despite this potential, however, the relationship between innovation investment and performance was insignificant, suggesting that the returns on innovation may take longer period to manifest.

The major conclusion of this study is that innovation investment partially mitigates the negative effect of competitive intensity on firm performance. Thus, while innovation can cushion firms against competitive pressures, its direct contribution to performance may be limited in the short term.

Recommendations

In view of the findings and conclusion of this study, the following recommendations are made:

- i. ICT firms operating in Nigeria should develop adaptive strategies to manage competitive pressures with focus on enhancing their operational efficiency and customer engagement.
- ii. It is pertinent for ICT firms in Nigeria to leverage competitive intensity as a catalyst for innovation, rather than considering it as a limitation. This of course, would necessitate a more strategic and well-thought out investments in the improvement of existing product/services as well as in the development of new ones, in order to sustain competitiveness.
- iii. Firms in Nigeria's ICT sector should have a long-term view of innovation investment rather than concentrating on short-term gains. They should also ensure that they complement such investments with robust implementation strategies that will ultimately actualize their performance goals.
- iv. The integration of innovation into the broader strategic framework of ICT firms in Nigeria is pertinent, ensuring that its innovation efforts align with other performance-enhancing activities of the firms in order to maximize its mediating benefits.

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